A Cauchy problem for a class of nonlocal and nonlinear equations arising in elasticity

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We will discuss the integro-differential Cauchy problem

$$u_{tt} = (\beta * (u + g(u)))_{xx} \quad x \in \mathbb{R}, \ t > 0$$
$$u(x, 0) = \phi(x), \quad u_t(x, 0) = \psi(x) \quad x \in \mathbb{R},$$

where $\beta$ is some integrable function whose Fourier transform satisfies a growth condition of the form

$$0 \leq \hat{\beta}(\xi) \leq C (1 + \xi^2)^{-r/2}.$$  

For certain choices of the convolution kernel $\beta$, the problem reduces to the well investigated Boussinesq type equations.

We prove general local well-posedness as well as global existence and blow-up results depending on $\beta$ and on the behaviour of the nonlinear term $g(u)$.

The presentation is about the ongoing work, with Nilay Duruk (Sabancı University) and Hüsnü Ata Erbay (İşık University).